

MOOSE DAY 2023 REPORT



Moose photographed by Kathy McCurdy during Moose Day 2023.

Summary

Prior to the mid-1800's, it is thought that moose were very rare in Wyoming. They increased in number throughout the 20th century in western Wyoming and by the early 2000's biologists estimated there were over 13,000 in the state. The Jackson Moose Herd increased to a maximum number of 1184 in 1988, but since then, has decreased. Currently estimated to be

around 400 individuals, the herd lost approximately 70% of its population in the last 35 years. The Wyoming Game and Fish Department (WGFD) monitors moose populations by performing aerial surveys to estimate their numbers. Since 2009, the Jackson Hole Wildlife Foundation (JHWF) has conducted an annual moose survey in the late winter. This survey contributes data which augment WGFD's aerial surveys. These volunteer-collected data are valuable because many observations are made on private land, where aerial surveys are not conducted. This year, the JHWF conducted the 15th annual Moose Day survey on February 25, 2023. Volunteer participation was higher than ever, with 130 individuals counting 112 moose during the effort.

Introduction

Historically, it is thought that there were very few moose in Wyoming. In the late 1800's, Shiras moose (*Alces alces shirasi*) began to colonize western Wyoming, moving in from Montana and Idaho. The Wyoming moose population eventually increased to an estimated 13,657 in 2001, but recently, declines in the statewide population have been noted (Brimeyer and Thomas 2004, WGFD 2017). In 2014, the WGFD statewide moose population estimate was approximately 4,050 animals (WGFD 2017).

In Jackson, moose surveys have been conducted by WGFD since 1985. The Jackson Moose Herd population peaked in 1988, when 1,146 animals were counted and over the past three decades, the Jackson Moose Herd has declined by approximately 70% (Figure 1).

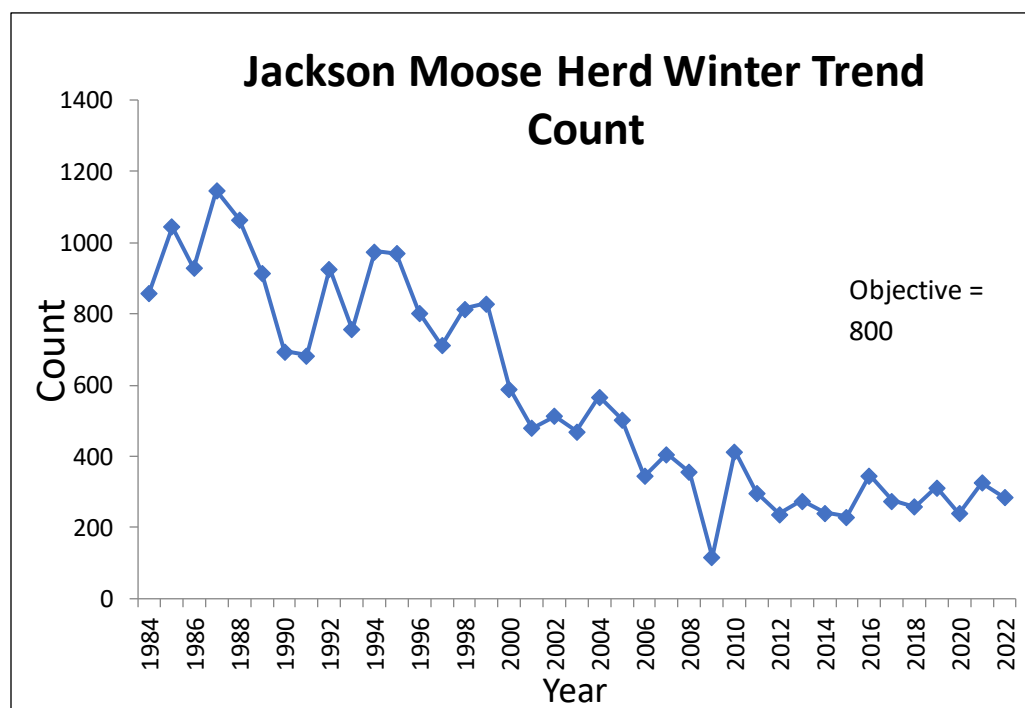


Figure 1. WGDF aerial survey data (including data from Moose Day since 2009) show a 70% decline in the Jackson Moose Herd over the past 38 years (Source: WGFD).

This decline is due to a variety of factors, including habitat deterioration, recolonization of wolves and grizzly bears, warming temperatures due to climate change, disease and parasites,

and vehicle collision mortalities (Courtemanch, pers. comm. 10/4/2021). Currently, the herd is estimated to be approximately 300 animals, which is about 500 below the WGFD management objective of 800 animals (WGFD 2023). Even though the overall herd numbers are low, the number of moose calves seen during the winter has increased in recent years. The WGFD measures a “calf to cow ratio” which is the number of calves per 100 cow moose seen during the survey. In 2009 this ratio was 15 calves per 100 cows and the ratio has increased to approximately 38 calves per 100 cows in 2023, which indicates a slowly growing population (Figure 2; Courtemanch, pers. comm. 10/4/2021).

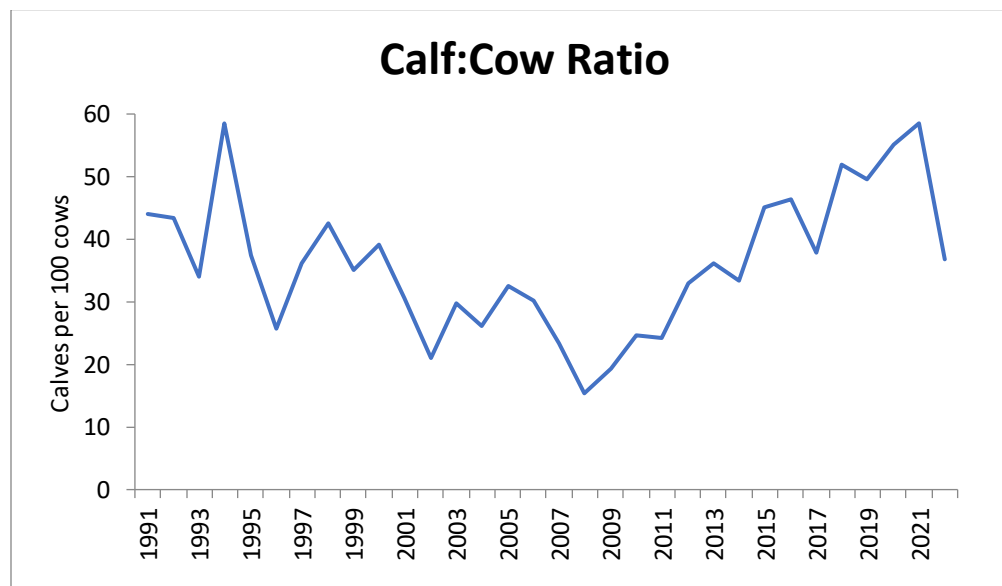


Figure 2. WGFD aerial survey data (including data from Moose Day since 2009) show an increasing calf:cow ratio in the Jackson Moose Herd over the past 31 years, which indicates a slowly growing population. The 2023 ratio dropped steeply after several years of growth. (Source: WGFD)

Jackson Hole Wildlife Foundation (JHWF) conducts an annual moose survey in which a corps of volunteers survey Teton County, Wyoming for moose during one day in late February or early March. The results from this moose survey augment the Wyoming Game and Fish Department (WGFD) aerial survey data, which are used to estimate the population of the Jackson Moose Herd. Some data are also collected from the Sublette Moose Herd on the southern end of Teton County and the Targhee Moose Herd on the west side of the Teton Range. Data collected by Moose Day volunteers are especially valuable because many of these moose observations are on private lands in areas where WGFD does not conduct helicopter surveys. Combining Moose Day observations with WGFD aerial survey data provides a more comprehensive view of overall herd numbers (Courtemanch, pers. comm. 10/4/2021).

Methods

Study Area

Surveys took place in Teton County, Wyoming. We divided Teton County into 59 areas which ranged as far north as Arizona Creek in Grand Teton National Park, east along the Gros Ventre River, west to the Idaho border, and south to the Teton County border (Figure 3).

Moose Day Study Area

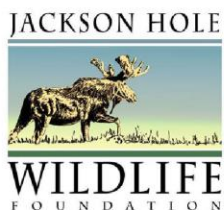
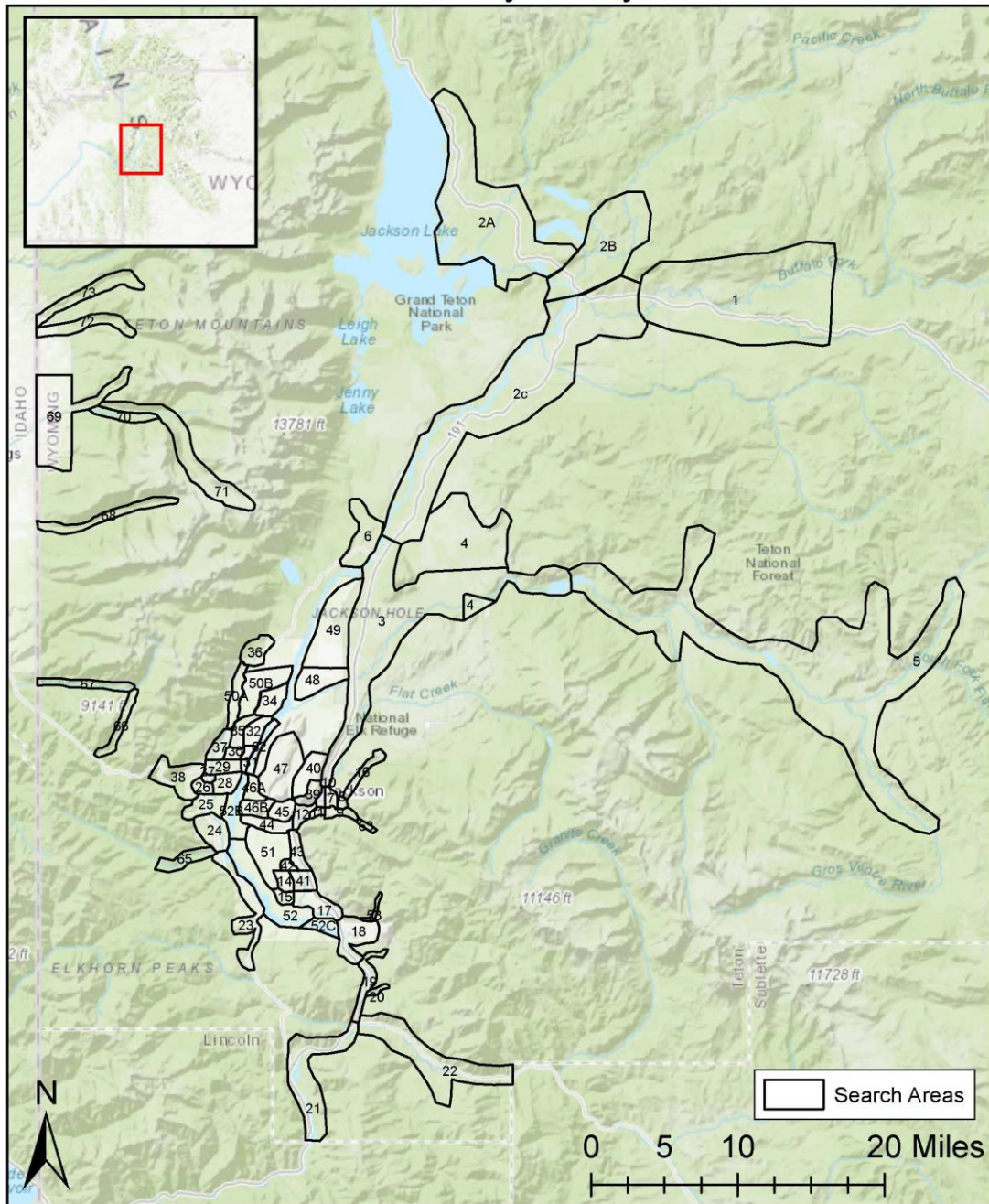


Figure 3. Map showing Moose Day study area broken into survey sections in Teton County, WY.

Volunteers

We recruited JHWF's trained Nature Mapping Jackson Hole (NMJH) volunteers to assist with data collection on this project, as well as enlisting the help of area biologists, wildlife guides, JHWF staff and board members, and other interested community members. Prior to Moose Day, we held a Nature Mapping training for new Moose Day participants. We also held virtual Moose Day training seminar in cooperation with WGFD, which was led by wildlife biologist Aly Courtemanch. The seminar included information on survey protocol, moose identification, aging, and sexing. We also discussed how to spot signs of parasites, such as winter ticks (*Dermacentor albipictus*) and arterial worms (*Elaeophora schneideri*) and gave a brief history of the Jackson Moose Herd. We organized surveyors into teams of at least two per search area throughout the study area.

Moose Survey

Each survey team was assigned an area. Most surveyors traveled in teams by car, intermittently getting out of the car, walking, peering over snowbanks, and scanning with binoculars. They scouted along main highways and throughout neighborhoods. Other surveyors skied and snowshoed public lands and private tracts. One team snowmobiled into the Gros Ventre drainage. Surveyors recorded the time, date, location, age, sex, and health condition of each moose encountered in their survey area, using either the NMJH smartphone application as a data entry portal or paper data sheets with subsequent data entry to the database online. As time and energy permitted, we encouraged surveyors to Nature Map other species seen in their survey area, with priority given to moose.

Data Analysis

Each moose observation was vetted and verified by WGFD staff. Observations were compared spatially and temporally to avoid double counting. We used Microsoft Excel™ to compare total moose numbers between years, as well as to calculate surveyor hours and effort. We also compared moose numbers to temperature and snow water equivalent (SWE) using Microsoft Excel™. We used [Weather Underground](#) to access weather and visibility conditions on the day of the survey, retrospectively. We used ArcMap 10.8.1™ to process and display spatial data for Moose Day. We assessed surveyor effort in two ways. We calculated the number of surveyor hours by summing the total hours each individual surveyor contributed to the project. We calculated total effort by summing the total hours each people unit (team of surveyors traveling together) contributed to the project. People units represent the surveyors' effort covering the search areas more accurately than the total number of hours each person contributed.

Results

Moose Survey

On February 25, 2023, we found 112 moose. Moose were detected in Alta, Moose Creek, Buffalo Valley, Gros Ventre River bottom (including the Upper Gros Ventre), neighborhoods throughout the West Bank, Cache Creek, Rafter J, and South Park (Figure 4).

Moose Day 2023 Observations

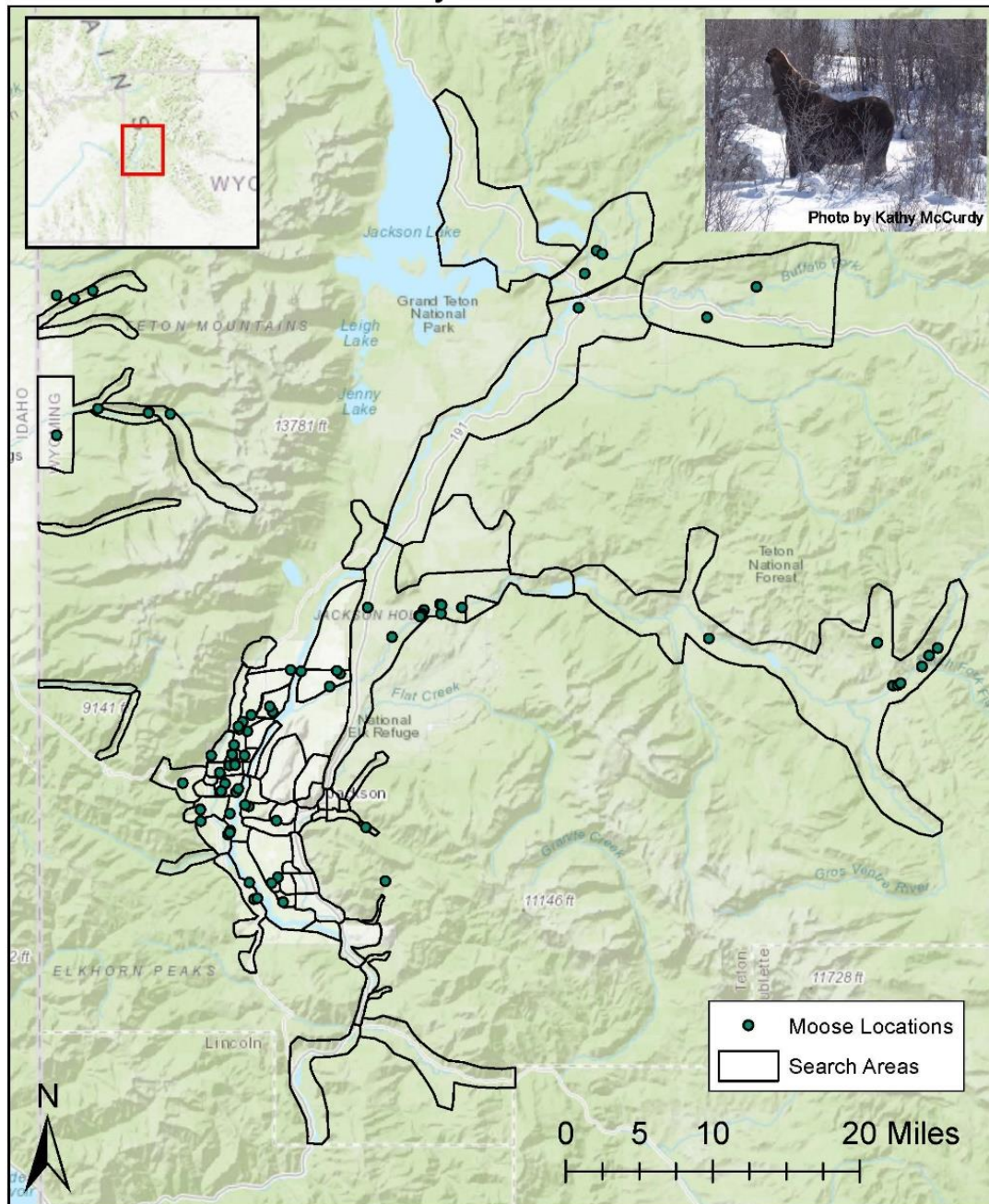


Figure 4. Map showing where moose were detected during the Moose Day 2023 survey. Moose were most frequently encountered along the West Bank, near Jackson Hole Golf and Tennis, and in the upper Gros Ventre. Several moose were also encountered in Grand Teton NP and on the west side of the Tetons.

Moose Day numbers have fluctuated throughout the years, with an average of 102 moose per year seen and a median of 97 moose seen. There is no strong trend seen in the Moose Day count data (Figure 5).

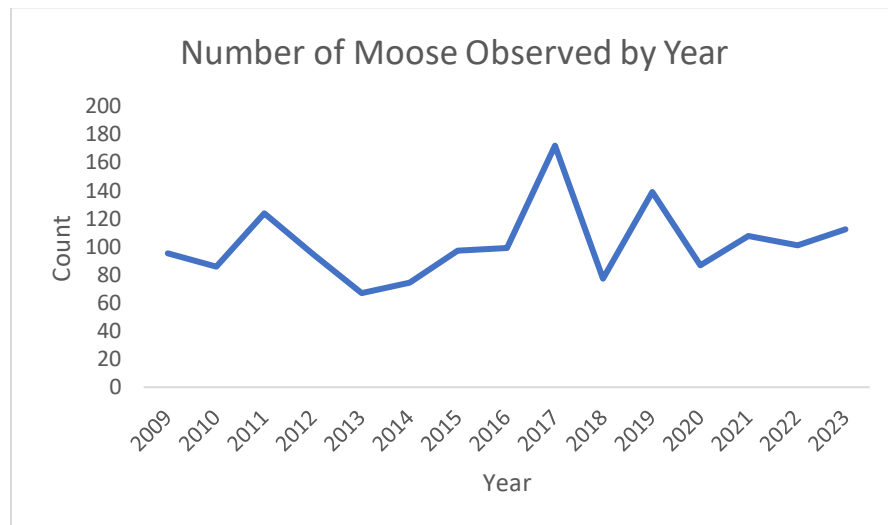


Figure 5. The number of moose observed during each Moose Day survey from 2009-2023.

We documented 45 females, 25 males, and 42 moose of unknown sex. We classified 87 moose as adults and 20 as juveniles. Five moose were unable to be aged and were classified as unknown (Figure 6).

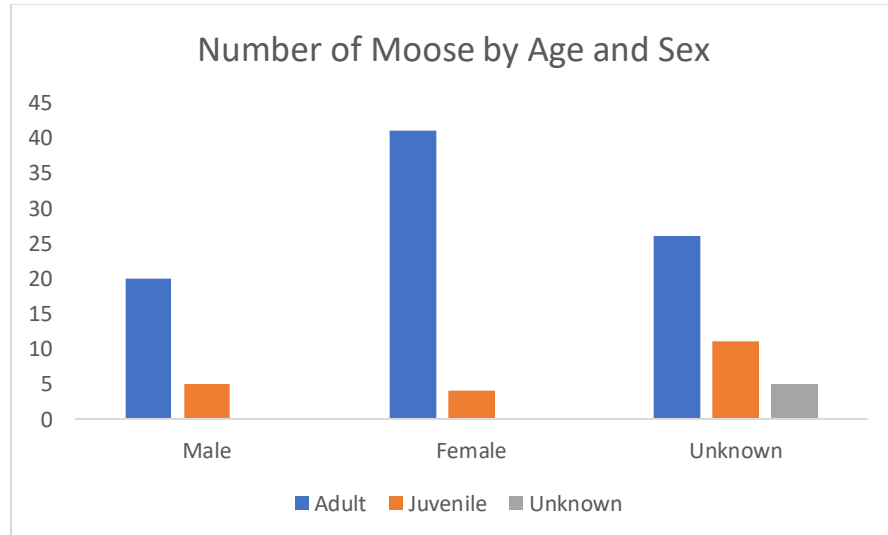


Figure 6. The number of male, female, and unknown sex moose per age class detected during the Moose Day 2023 survey.

This year, we observed moose in good shape with glossy, full coats. There was one report of a moose accompanied by black-billed magpies, which indicates that it likely had some ticks, but most observers who made notes about coat condition indicated that animals looked healthy this year. Three observers noted that the moose they saw had cropped ears, which is indicative of

the arterial worm *Elaeophora schneideri*. Many observers made notes about the difficulty of navigating the deep snow, even for the long-legged moose they observed.

We observed and Nature Mapped many other iconic Greater Yellowstone Ecosystem wildlife species including bighorn sheep, coyote, elk, mule deer, river otter, red fox, and red squirrel. Lots of birds were also mapped this year including American dipper, bald eagle, Barrow's goldeneye, black-billed magpie, black-capped chickadee, Bohemian waxwing, brown creeper, Canada goose, Clark's nutcracker, common goldeneye, common merganser, common raven, Eurasian collared-dove, European starling, golden eagle, hairy woodpecker, mallard, mountain chickadee, pine siskin, pink-sided junco, red crossbill, red-breasted nuthatch, ruffed grouse, spotted sandpiper, Townsend's solitaire, trumpeter swan (Figure 7), and white-breasted nuthatch.



Figure 7. A subadult Bald Eagle was photographed by Ash Hillary during Moose Day 2023.

Surveyor Effort

In 2023, 131 surveyors comprising 46 people units spent 425.75 total hours (180.25 hours by car, 195.5 hours by ski, 8.75 hours on snowmobile, 30.75 hours walking on foot, and 10.5 hours by snowshoe) surveying for the Moose Day survey. The total effort (effort per people unit) was 159.75 hours.

In addition to trained Nature Mappers, agency biologists representing Grand Teton National Park, Bridger-Teton National Forest, Teton Conservation District, and Wyoming Game and Fish Department participated in the Moose Day survey. Staff and board members of the Jackson Hole Wildlife Foundation also participated.

Volunteer participation has risen through the years, with 2023 having the highest participation in the event ever (Figure 8).

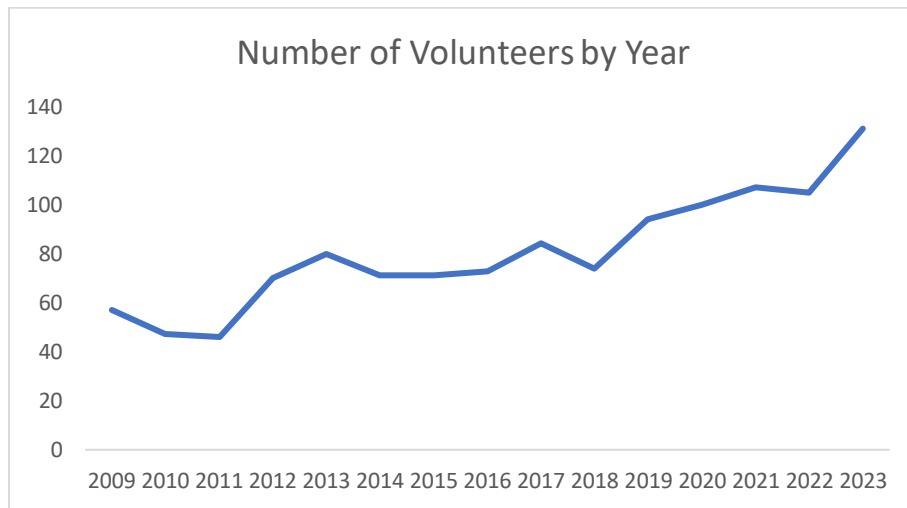


Figure 8. The number of volunteers which have participated in Moose Day has risen throughout the years. 2023 had the highest participation in the event ever with 131 volunteers.

Weather

Conditions on February 25, 2023 between 6:00 am – 4:00 pm were partly to mostly cloudy. The WSW wind averaged 10 mph. Temperatures were very mild, starting out at 18°F at 6AM, reaching 33°F by noon, and rising slightly more to a high of 36°F by the late afternoon. The day average temperature was 24°F. Visibility was excellent (10 miles in any direction; Weather Underground 2023). The Snake River Basin was at 79% of the 30-year median snow water equivalent (SWE) on February 25, 2023 (WWRDS SNOTEL precipitation update found [here](#)).

We did not find a correlation between SWE or temperature and the number of moose seen during Moose Day (Figures 9 and 10).

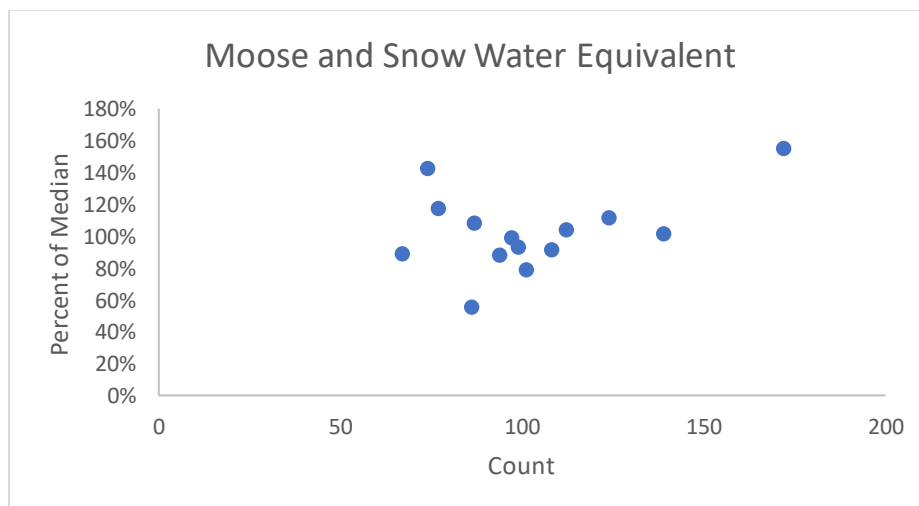


Figure 9. There was no strong correlation between snow water equivalent percent of median on Moose Day and number of moose seen on Moose Day between 2009 and 2023.

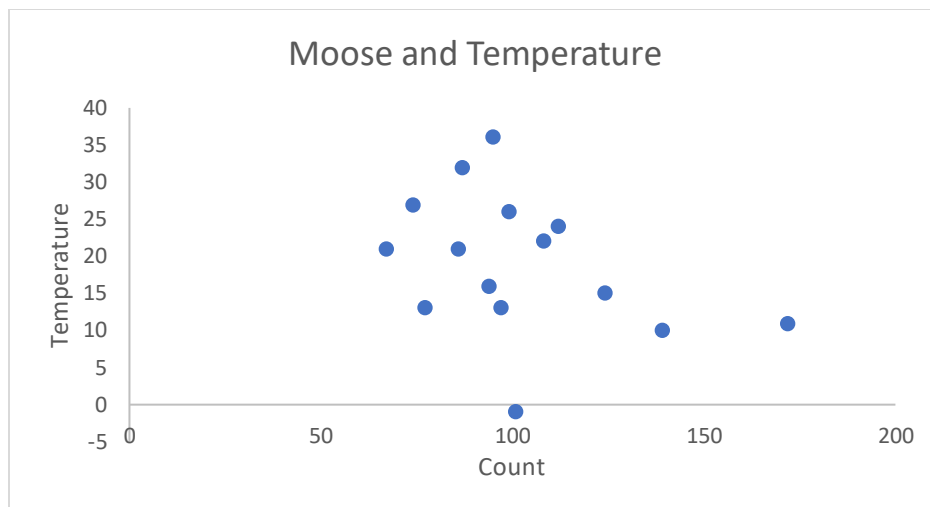


Figure 10. There was no strong correlation between average daily temperature on Moose Day and number of moose seen on Moose Day between 2009 and 2023.

Discussion

Moose Survey

The total Moose Day count of 112 is above the long-term average of 102 moose. The proportion of male to female moose returned to usual this year and similar numbers of females of both adult and juvenile moose were seen. Age class proportions were also similar to previous years.

In 2017, we recorded 172 moose. This record number was mostly due to the 57 moose detected by the snowmobile crew which traveled into the Upper Gros Ventre to the Darwin Ranch. This same route produced a more typical 16 moose in 2023. These differences in counts are likely due to different weather conditions, snow depths, and spatial distribution of moose in the area, and are not necessarily an indication of a population decline in the Gros Ventre drainage. Many more moose are typically counted during WGFD's aerial moose survey in that area than are encountered by snowmobilers during Moose Day.

One limitation of Moose Day is that moose need to be within sight distance of roads or trails where surveyors can observe them. Therefore, these data are especially useful when paired with aerial survey data that encompass the larger area.

Volunteers

Over 15 years, the number of Moose Day volunteers has risen, and 2023 had remarkable participation with 131 volunteers surveying for moose across Jackson Hole. Many are long-time Nature Mappers and Jackson Hole residents, but several participants were newcomers to the community who helped survey their neighborhoods. Our Moose ID clinic was well attended. We continue to provide this educational experience for our volunteers as it increases participants' ability to properly age and sex moose, as well as providing an update to participants on the status of the Jackson Moose Herd.

We also engaged visiting volunteers in Moose Day this year through our Being Wild campaign. We had approximately 15 participants, including several true visitors (non-residents), at “Hosted Moose Day,” where JHWF staff introduced visitors to Moose Day at Cache Creek. Visitors learned about the event at a booth and then walked up the Cache Creek Trail to survey for moose. One moose was seen by the group. The total number of volunteers reported above does not include the 15 participants from this group.

Weather

The Natural Resources Conservation Service (NRCS) installs, operates, and maintains an extensive, automated system to collect snowpack and related climate data in the western United States called SNOTEL (SNOWpack TELemetry). Snow water equivalent (SWE) is the measurement of the amount of water contained within the snowpack. Higher SWE indicates a denser snowpack and lower SWE indicates a less dense snowpack. The percent of the median on a given date tells us how snowpack and its water content compares to previous years on the same date. This year the percent of the median was 79%, meaning SWE was below the median measurements of previous years. Our data show no correlation between SWE percent of median and number of moose detected on Moose Day. There was also no correlation between average temperature on Moose Day and the number of moose detected.

Acknowledgements

Thank you to all the volunteers who spent time on Moose Day 2023 searching for moose in Teton County. First, a huge thanks to Frances Clark, who has generously dedicated countless hours of volunteer time to organizing Moose Day and Nature Mappers for many years. We also give special thanks to our partner agencies and their staff for their contributions to the cooperative cause of Moose Day. This year Morgan Graham of Teton Conservation District, Mark Gocke of Wyoming Game and Fish Department, Sarah Dewey and Carson Butler of Grand Teton National Park, and Ashley Egan and her crew from Bridger-Teton National Forest participated in the survey. Several representatives from Jackson ecotour companies participated as volunteers on Moose Day 2023. We appreciate AJ DeRosa (JH Vintage Adventures), Matt Fagan (Buffalo Roam Tours) and several guides from JH EcoTour Adventures for donating their time to help us count moose. We also thank owners and property managers for giving their generous permission to our teams to survey Snake River Ranch, Spring Creek Ranch, Jackson Hole Winery, Jackson Hole Golf and Tennis, Teton Pines, Astoria Park Conservancy, Snake River Sporting Club, and Teton Science Schools. Thanks to the many other private landowners who allowed us access to their properties and submitted data to the Moose Day 2023 survey. And finally, many thanks to Aly Courtemanch, lead for Moose Day at WGFD. Without her, we would not have Moose Day!

References

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